

# The Mining Journal,

## RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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## Original Correspondence.

## AN OPPORTUNITY FOR COLLIERY REFORMS.

There are few who with the opening of a new year are unaccustomed to glance at the past to see in what way its experience may suggest improvements as to the future. Now and then current events, as well as passing time, are favourable to such reviews. A happy combination of time and things is just now, we think, noticeable in the important mining district of South Staffordshire and East Worcestershire. There are those who would not so look upon what is happening there, but they take too gloomy a view of the situation. The year of grace one thousand eight hundred and seventy two will see many changes, even as December in the year that so recently expired saw alterations of which January little dreamt. Nor is it to be said that all these alterations have been to the disadvantage of the employer, though the employed have been the most benefited immediately. And it is to matters affecting the relationship of masters and men that we are now addressing ourselves. Let us believe that a future of much hopefulness yet lies before employers and employed in that ancient coal basin; indeed, if both be wise, that future may already be entered upon.

It has been many years since so numerous a meeting of colliery proprietors and colliery lessees was held as that which came off in Birmingham on Thursday, last week. Nor at any other meeting within recent years has the relation between master and man in the collieries been more fully discussed. It originated in the application of the men to have the nine-hours adapted to colliery work. Whilst that which has, not infrequently, we think, been termed "the nine-hours epidemic" is affecting other districts, it is hardly surprising that it should attack the colliers in South Staffordshire, a district in which it has been adopted in many of the leading manufacturing and constructive industries. But, however applicable it may be to other trades in Staffordshire, and even easier hours to collieries in some other districts, nine hours are inapplicable to that coal field. True, the working hours in a Staffordshire colliery are from 6 to 6, and, allowing one hour for dinner, are therefore eleven hours a day. Yet the Staffordshire colliers do not work 54 hours a week, or even 51. It is simply nonsense to talk of nine hours a day when men work scarcely half the week. Very little more than half time is the average working period of the Staffordshire miner. No one will, therefore, be surprised that, after well discussing the application, and remembering the great difficulty that is being experienced in getting enough fuel to carry on the blast-furnaces and the finished ironworks in the district, the colliery proprietors should have decided, at their meeting in Birmingham, that their men had no claim to the nine hours, and that its concession would be prejudicial to the interests of both sides. Still, we venture to ask if this very application does not afford the employers an opportunity of freeing themselves from shackles that have hampered them for long years past, and that were never felt to be more impeding than they now prove?

Colliery proprietors in Yorkshire and Lancashire must feel for their compeers in Staffordshire when they call to mind that wages in that district are paid as well in ale and coal as in money. Without the interposition of the butty-collier such a practice would be next to impossible. To him the habit may not be objectionable, but to the mining engineer and the mine proprietor it is next to intolerable. It originates endless disputes, is destructive to discipline, if it does not produce disorganisation, and the subsequent recklessness that leads to frequent accidents as well by day as by night. Why, the last notable accident in the district, which took eight lives, and fired a pit, was immediately connected in its fatal issues with the custom of drinking in the pit. The poor fellows were all found lying around their half empty ale-bottle, dead where they lay down to sleep after thus supping. Although it was night yet sleep had become more urgent because of the nature of their repast, and sleeping they were all too unconscious of the fire, whose developed gases poisoned them into the sleep of death. The quality of the drink never satisfies the men, who characterise it as "wobble," and the coal supplied to them is never good enough, or is unduly withheld.

There can be no doubt that the men when they asked for the concession of the nine hours meant that their pay should be an alteration in the existing terms by which they should be advantaged. Near were they paid higher wages either as bandmen or as pikemen. The pikemen are those who "undergo" a certain quantity of coal that is designated a day's work. The allotted quantity or "stint" is finished usually early in the afternoon, and the men make on an average a day and a half every day they work. The present wages in the Thick coal are 5s. a day. Thus a pikeman may confidently look to earn 7s. 6d. a day in money, and the allotted quantity of ale and coal. It cannot, therefore, be said that the Staffordshire colliers have much cause for complaint in the matter of wages. But they are not satisfied, and the supply being under the demand they are trying to make the best of their subsisting advantage. Happily they are learning to discountenance strikes; and though in reply to their masters' resolution they have many of them sent in notices that they shall leave off work in a fortnight, yet it is not believed that if they are not flatly refused all concession they will turn out. They do not all ask for the same terms, but it is needful that as far as possible one scale of wages should prevail, as now throughout all the Thick coal district, and another throughout the Thin, whilst to both the same hours should apply. They were the Thick coal men chiefly whose application was considered at the Birmingham meeting. Since then the Thin coal men have determined upon memorialising their employers for shorter hours, and they have appointed deputations to support the memorials.

Are there not here all the elements that rightly used would result in the adoption of a system of conciliation and arbitration by which the "allowance drink" and the "allowance coal" may be made to follow the abandonment of truck, and by which regularity of work during shorter diurnal periods may result in a considerable increase in the time wrought, and a notable addition to the quantity of mineral brought to bank? Already certain leading masters have expressed themselves as not unwilling to adopt even the nine hours if they could be guaranteed regularity of work by the men during nine stated hours every day. With eight hours prevailing in South Yorkshire it must be anticipated that some more regular and some more "advanced" system than now prevails must soon be brought about in South Staffordshire. We trust that in that district men and masters

will alike review their position, and come amicably to such a rearrangement of terms as shall at once promote the prosperity and the safety of mining there.

## IRONWORKS AND COLLIERIES IN YORKSHIRE.

## SHARLSTONE, THE DEEPEST COLLIERY IN YORKSHIRE.

Up to a month or two ago Denaby Main, near Mexborough, enjoyed the reputation of being the deepest coal pit worked in Yorkshire, but any honour connected with such a circumstance has been taken away, and transferred to the western part of the Riding, although, singular as it may appear, the principal shareholders in the one undertaking are largely interested in the other. The Sharlstone Colliery, situated about three miles from Normanton, and one mile from the railway station and village from which the name is derived, is one of the finest in the district, and in many respects is unique, more particularly with regard to the underground workings and the machinery both at the top and bottom. The drawing-shaft (which we went down) is not a vertical one to the bottom, so that there are two liftings to the surface from the lowest seam. The first bed is to the Stanley Main, distant from the surface 335 yards, and then from that there is an entirely distinct shaft 175 yards lower to the Haigh Moor seam, making the total depth 510 yards.

The general appearance of the top of the colliery shows that everything has been done, and every necessary appliance brought into requisition for doing a large business by the most approved and economical methods. The head gear is of stout pitch pine and English oak, strengthened in every way, 36 ft. high, the pulleys being 15 ft. 2 in. in diameter. The ropes are of fine wire, working single-decked cages, the actual strain or weight at each draw being about 6 tons. The engine-room in which are the drawing-engines is a model of cleanliness. The engines are of 80-horse power, with a 17-ft. drum for the rope, the motive-power being supplied by five double-flued boilers, 35 ft. in length and 6 ft. 6 in. in diameter, with patent Galloway tubes. In another place are fixed a pair of small engines to which a cage can be attached, and be speedily rigged for going direct to the bottom seam, and so bring out the men in the event of any accident occurring—a precaution the wisdom of which cannot be over-rated.

The various workshops are all large and well-ventilated, fitted up in the most complete manner, and include a saw-mill, worked by a 13-horse power engine, where the necessary timber for propping, &c., is cut up. In connection with it there is also a carpenter's shop, 49 ft. long and 39 ft. wide, where the wagons are repaired, and even made, with the exception, we believe, of the wheels and axles. The blacksmiths' shop is a fine room, 20 yards long by 15 yards in breadth, with four hearths, having a drilling-machine, lathe, and, we believe, a small steam-hammer. All the shops, offices, &c., at the top are lighted with gas made on the premises, whilst the bottom of the pits are supplied with it by means of Huntress, Wilson, and Co.'s steam-jet, which diffuses a brilliant and uniform light, and, as the manager informed us, worked admirably. There is a very fine stack at a convenient distance from the shafts, being 47 yards in height and 15 ft. in diameter at the bottom.

After visiting the lamp-room, close to the top of the drawing-shaft, we descended to the Stanley Main, at a distance, as before stated, of 335 yards. The seam named was worked up to the time of the Haigh Moor bed being reached, but is not now, as the other is by far the most valuable. The Stanley bed, however, is about 9 ft. thick, and gives about 5 ft. of clear coal, as follows:—

Coal—Bride Cake .....	0 ft. 6 in.
Coal—Blackband .....	1 6
Dirt .....	1 9
Coal—Lime .....	2 0
Dirt .....	1 9
Coal—White side .....	0 2
Coal—Best .....	1 4

Total thickness of seam ..... 9 ft. 0 in.

After an easy descent to the Stanley Main pit, which occupied about 40 seconds, we found ourselves in a well-lighted and spacious place, fitted up in the most complete manner with powerful machinery, head-gear, &c. In our course downwards we passed through several sections of coal, amongst others—

Sharlstone top coal, 50 yards from the top .....	3 ft. 0 in.
Coal, 74 ditto ditto .....	3 2
Coal, 114 ditto ditto .....	3 0
Cat coal, 295 ditto ditto .....	2 6
Shale coal, 315 ditto ditto .....	3 2

Although none of these seams are being worked, yet some of them are of very good quality, and no doubt at some future period will be found sufficiently valuable to be got.

At the bottom of the Stanley Main, after leaving the chair, is a fine brick archway 9 ft. by 9 ft., and by going about 24 yards due south the Haigh Moor shaft is reached, the diameter being the same as the Stanley—13 ft. clear. Everything about the bottom connected with the machinery is of the most massive and substantial character, and the arches and walls are of great thickness, upwards of 2,000,000 bricks having been consumed in their construction. The walls are 6 ft. in thickness, and the landing place, where the coal is raised from the Haigh Moor to the Stanley pit, is 17 ft. wide, 72 ft. long, and 15 ft. high. The place over the shaft for the working gear is 32 ft. high, 20 ft. long, and 17 ft. wide. On a raised and very solid platform are a pair of very fine horizontal engines, by Bradley and Craven, of Wakefield, each being of 40-horse power. The drum is 13 ft. in diameter, with a round wire-rope, and 700 tons a day can be drawn from one seam to the other. The foundations for the engines are such as are not often met with, from their great solidity, whilst it is evident great difficulty must have been experienced in transporting the heavy material from the top to the bottom. Some of the stones used in the foundations are upwards of 6 tons in weight, whilst the arch consists of a thickness of seven bricks. There are the other appliances for engine-work, whilst the engines are in excellent condition, and this part of the workings in particular is well worth visiting.

About 20 yards to the west, and 40 yards to the north, of the engines there is the boiler-room. The place is as yet incomplete, there being only two ordinary egg-boilers at work, being about 32 ft. long and 4 ft. in diameter, and fed by a pipe from behind the tubbing in the shaft, the water being brought from a point about 30 yards from the surface. The foundations, however, for two more boilers have been nearly completed, and they will be placed alongside the others when all is ready. Not far from the boiler-room is a blacksmiths'

shop, where all the necessary work for the colliers working in the bottom is performed, so that there is a great saving in time effected, as the picks are sharpened almost on the spot, instead of, as at most collieries, being sent to the top. The ventilation is obtained by the ordinary furnace means, and about 120,000 cubic feet of air passes through the workings every minute. The grating of the furnace is 26 ft. long and 5 ft. broad, with four fire-holes at the side, the consumption of fuel being about 80 tons per week.

On descending from the Stanley Main to the Haigh Moor seam no coal of any importance intervenes. The following, however, is a section of the bed:—

Sharlstone Wallsend coal .....	4 ft. 2 in.
Dirt .....	2 9
Coal .....	1 4
Dirt .....	0 4
Coal .....	1 2

Actual thickness ..... 9 ft. 9 in.

Only the Top coal, the Wallsend, as it is called, is being worked. It is of excellent quality, and in great demand. The main roads in the Haigh Moor pit run east and west, the levels being of height sufficient to admit of a person walking upright. The coal, which is worked on the long wall principle, rises to the extent of about 4 inches per yard, and is taken to the bottom by means of self-acting inclines.

The company, which is a limited one (composed of but a few gentlemen), includes the names of Mr. Pope, the managing director; Mr. Baines, Leeds; and Mr. Crossley, Halifax; and have about 100 houses at present for their workpeople, but that number will be considerably increased as time progresses, seeing that it will be to the interest of the proprietors to have those in their employ located near to their colliery. That the moral and intellectual welfare of the workmen will not be overlooked the names of the gentlemen we have above given will be a certain guarantee; and we may say that we were pleased to find that not far from the offices was a reading-room and library. As before stated, there are few collieries in Yorkshire that will better repay a visit than that at Sharlstone; and heavy as must have been the expenditure in sinking it and putting down the machinery, there is every appearance that the proprietors, from the excellent quality of the coal produced, will find their spirited investment a most profitable one.

## IRON TRADE OF NORTHAMPTONSHIRE.

The past year has been the most eventful one in the history of the iron trade of the county of Northamptonshire, and from it may be dated a new era in the annals of that industry which will make the county one of the most important in the kingdom. Up to some three or four years ago Northamptonshire was almost a terra incognita, until brought into its actual worth and importance by a series of notices from one of the special correspondents of the *Mining Journal*. Since, then, however, the ironstone found in all parts of the northern division of the county has attracted the notice of capitalists, and the new year opens with the brightest prospects so far as regards the development of the valuable beds of ore which permeate nearly the whole of the county. The manufacture of pig-iron will also be very largely increased during the present year. In 1869 the quantity of ironstone raised in Northamptonshire is given by Mr. Hunt, the Keeper of Mining Records, at 540,259 tons, but we have the best reasons for knowing that the figures given fall short of the actual tonnage raised by at least 100,000 tons. During the latter part of the year just closed Messrs. Butlin and Co., in addition to keeping three furnaces of their own going, have been sending away something like 3500 tons of ore to the North of England, whilst the quantity raised in the county during the year will in all probability be found to exceed 700,000 tons.

The Glendon Company, whose works are about three miles from Wellingborough, have had three furnaces in blast during the greater part of the year, and have also sent a very large quantity of stone into Derbyshire and Yorkshire, via the Midland. On the same route of railway it is proposed to open out the Neville-Holte property, near Market Harborough, which abounds with excellent ironstone, a company having been formed for the working of the minerals and the erecting of the blast-furnaces. Near to Thrapstone, on the London and North-Western line, new furnaces are also about to be erected, and the ore in that very important district more energetically worked than it has yet been. On the estate of the late General Arlathnot, where some of the richest stone in the county has been found, preparations are also being made for more extensive working. Islep also promises to become an important locality, as it is said that Mr. Plevins, of the Heyford Ironworks, and some other gentlemen, are about to open out the minerals there, and start some blast-furnaces. On the southern side of Northampton an increased trade will be done during the year at Duston and the neighbourhood, whilst at Blisworth, Gayton, and from there to Weedon, there will be a large increase in the trade, as there is at present a demand for more stone for Staffordshire and South Wales than is being raised. Mr. Plevins has had for a considerable time three furnaces in blast at Heyford, near Weedon, and there is a ready market for all that is produced. In the neighbourhood of Daventry and Rugby there is now every prospect that the mineral deposits will be tapped during the present year, whilst in the adjoining county of Oxford, at Banbury, a large increase in the output of ore is sure to take place, more especially by the company of which Mr. Roseby is the chief.

Judging from what is proposed to be done, there is every reason to believe that the tonnage of ironstone raised during 1872 will not fall far short of 800,000 tons, and the production of pig-iron may be taken at 55,000 tons. Seeing that it is only about 18 years since ironstone was raised in Northamptonshire, and any attempt made to produce pig-iron in the county, the above facts cannot be otherwise than gratifying to all engaged in the development of the minerals of a county which at one time was supposed to be entirely free from anything at all calculated to find other than agricultural employment for its inhabitants. Much of the success, however, is undoubtedly due to one man, Mr. W. Butlin, who may be styled the father of the iron trade in Northamptonshire, and who for many years spared neither time nor money in making known the value of the Northamptonshire ore, and who is now, we are glad to say, reaping no inconsiderable advantage for his spirited enterprise, and in which many others are now participating. In manufacture from an excellent business is being done in railway sleepers, stoves, grates, kitchen-ranges, &c., and there are very large orders in hand for the new year.



neer at a pressure of 300 lbs. to the square inch. A pipe about 1 in. in diameter should be laid on from the receiver from the up and down cast shafts. A number of small receivers should be placed in the roadways of the pits, tunnels, or workings. These receivers should be furnished with pulse valves, to prevent back action in case of breakage. Small delivery hose should be attached to each receiver, and the receivers should be connected with each other. Jets may be fixed like gas-pipes, and a vapour of the fluid employed may be used instantly in any part of the mine. A man by this means might go through the workings, and instantly depolarise all the carburetted hydrogen and carbonic acid found in the pit. The mist may be distributed throughout any chamber, by which means a very small quantity of the fluid will render the pit, or mine, perfectly healthy. I may state that this fluid has no injurious effect on the health of the men. This, perhaps, is the strangest part of the discovery, that the fluid possesses a power of rendering caverns and tunnels salubrious and healthy, while it has no effect whatever on the respiratory organs of mankind. Again, there is no reason why this very material may not be employed to work the coal-cutting machines, and the escape may be distributed so as to render ventilation unnecessary, as the mixture is capable of restoring equilibrium in the properties of the atmosphere.

As a matter of course, it must be distinctly understood that the escape of this fluid can do no harm at any time, therefore I contend that any objection raised to its employment can only arise from ignorance, indifference, or prejudice. The expense of employing this vapour in a coal district is simply nominal. A ton of this prepared fuel would be sufficient for keeping a coal mine clear of vapour for several months. It is not essential that the vessels in the bottom of the pit be charged at 300 lbs. on the square inch; 150 lbs. on the square inch is the proper pressure to work at; and I may state, for the information of those whom it may concern, that the same execution may be done by an apparatus working at 150 lbs. on the square inch as may be accomplished with 25 apparatuses working at 100 lbs. on the square inch; and, further, that its power of depolarising carburetted hydrogen diminishes in the general ratio. It will require 100 times more fluid at 15 lbs. on the square inch than is required at 150 lbs.; and, further, it will require 10,000 times the amount of fluid either to extinguish fire or neutralise hydrogen at 1000 lbs. on the square inch than at 150. It must, therefore, be distinctly understood by all persons wishing to introduce this invention into any factory, or working, that 150 lbs. on the square inch is the standard.

It appears to me, from long investigation of this subject, that the proper application of this fluid to produce the most useful effect may be considered analogous to the respiration or breathing apparatus of the lungs of mankind—that is to say, 15 lbs. on the square inch of our common atmosphere is the true standard, or requisite pressure, for sustaining the conditions of life and motion; and it is just as essential, if fire is to be scientifically dealt with, and hydrogen and noxious vapours neutralised, that this standard law of 150 lbs. pressure should be distinctly understood, and scientifically dealt with accordingly. Any deviation from this general law can only incur waste of time and material.

I have endeavoured to be as explicit as possible in this matter, because I am fully aware that many persons who may be anxious to introduce this invention into their districts may not possess time or inclination necessary for reducing elementary laws to their true mathematical proportions; and our friends may rest assured that whatever obstacles may present themselves in analysing the various laws of Nature, there are a few simple principles in full operation in regulating the various forces now in action, and that it is the duty and destiny of mankind to develop in every possible way the harmony by which those laws are regulated. Solving this is the true philosopher's stone. I trust, therefore, that this invention will be investigated, and put into operation first amongst the most fiery mines of this country, seeing that it is of the most simple character, and very inexpensive. I see no reason why the subject may not be taken up and immediately adopted by the various mine proprietors, as the invention is calculated in every way to protect their property from destruction, and at the same time to give the conditions of health to the working miners.

I may state, before closing this letter, that I shall be prepared to answer, through the Journal, any question that may arise respecting this invention; and, further, I may say it has been a great consolation to me to know that I have been instrumental in helping those who could not help themselves.

THOMAS ATKINS.

26, Budge-row, Cannon-street, London.

P.S.—We have prepared apparatus for distributing the vapours at the pressure before mentioned, and, as many of the pits are already fitted up with pipes for conducting compressed air to the coal-cutting machines, there can be no objection to the pipes being employed and connected with the various receivers, as our pressure is distinct to that now used for the compressed air. This would considerably reduce the cost of applying this invention to the mines; and, further, as this invention requires 1-10th water to be used, this will be ample to lubricate all the plugs and valves for the keeping down the temperature to the most economical point of working.—T. A.

#### THE POSITION AND PROSPECTS OF MINING.

SIR.—Taking a retrospective glance over the year just closing, mine adventurers may well congratulate themselves upon the vast improvement which has within that time taken place in the price of metals, and upon the excellent prospect which exists of a long continuance of the present prosperity. Mines which at previous prices for copper and tin would scarcely return the outlay made upon them have been enabled to give dividends to the adventurers, in many cases sufficient to compensate for heavy and annoying disappointments elsewhere; and mines which had long been struggling on at much disadvantage in consequence of insufficiency of plant and machinery have been enabled to place themselves in the best possible position for future profitable working without calling for further contributions from the shareholders. All this, moreover, notwithstanding the constantly increasing value of labour and a considerable increase in the no less indispensable requisite for all industrial operations—fuel. Coal is at present from 3s. to 4s. per ton higher than at the close of last year, chiefly owing to the higher wages paid to colliers; yet, whilst the improvement has been productive of material benefit in the colliery districts, the metalliferous miners have so largely participated in the general prosperity that the increased price of coal has caused no serious inconvenience even at mines where the quantity of steam-power employed, and consequently the consumption of fuel, is the largest.

The mines which have derived the greatest advantage are doubtless those producing tin; but copper mines have likewise obtained considerably higher prices for their produce; and although the price of lead has not advanced to the same extent, the improved commercial position has permitted an advance of 12 per cent possible, notwithstanding the largely increased supply. The consumer has recently been paying 20s. per ton more for tin than at the commencement of the year, and such is the confidence of the smelters in the stability of the market, though all were aware that the excessive prices which ruled for a few days could only be temporary, that they have made an almost corresponding advance in the standard upon which they purchase their ores. Although a very small proportion of tin enters into the composition of tin-plates, a rise of from 4s. to 5s. per box in the latter has been established; and as previously to the late improvement in the metal markets the tin-plate makers have had a very small margin for profit, and as iron is also dearer, it is probable that at least present prices will be maintained, even should tin be quoted somewhat lower. The prospects of the market with regard to other metals are equally favourable, as stocks are generally low, and the demand is excellent.

In this position of affairs it is not surprising that the disposition to invest in Cornish and Devon mines should be much greater than it has been for some time, and since, judging from the large amount of capital supplied by British capitalists for the development of American mines, it is evident that there is an abundance of money at disposal for speculative purposes, I would earnestly recommend all who have money to spare to ascertain more about the tin and copper mines of our own western counties, instead of sending it abroad

for the benefit of the owners of mines in the western states of America; and I am convinced that while metals remain at anything like their present price they will obtain a far larger interest for their money.—Jan. 1.

CORNUBIENSIS.

#### THE NEW YEAR—1872.

SIR.—The New Year opens to the Queen's subjects with many reasons for thankful reflections, yet associated with pertinent warnings; the year just passed is allied with grave and serious retrospects, and the future is fraught with the liveliest hopes and forecasts of domestic and foreign peace, commercial prosperity, active and prosperous trade and manufacture, added to ample and remunerative labour. What would our national holiday—Christmas—have been but for the favourable course vouchsafed to our noble Duke of Cornwall? His illness conspicuously developed the combined intensity and individuality with which the Prince of Wales's danger was felt in every home, not only of the United Kingdom but throughout the whole empire. The Queen throws open the halls of Windsor, and the family banquet displays a warmth of domestic hope and happiness that augurs well for the future, and sets an example of royal affection that should extend its power throughout the families of the nobles and wealthy who circle around their hearths at this hospitable season of the year. We would, if we dare, say that the continental storm is finally allayed, but the words of bitter recrimination between German and French statesmen are jarring against messages of peace, whilst the latter has unquestionably to pass through a constitutional convulsion. It is monstrous to contemplate an additional charge of 20,000,000l. annually, consequent on the war. It is true that 213,649,000l. has been paid or provided for, with 126,351,000l. still owing, to liquidate the indemnity to Germany. The estimated revenue for 1872 is put down at 97,174,500l.; the expenditure will be increased 6,000,000l. annually, accumulative debt for interest on the sum still due to Germany: whilst M. Poyet-Quertier's statements conclusively show that the taxation of France will become 110,000,000l. permanently annually. From whence will this sum spring, and permit trade and commerce to maintain their "standards" in the marts of the world? far less to speak of progressing prosperity. Expansion for many years is wholly out of the question!

England, what hath thou to be proud and thankful for! It is true a national debt of about 800,000,000l. exists, yet thy credit is equal to grapple with the burden, for with borrowing powers of 32 per cent. interest, and an annual revenue from agriculture, mining, trade manufacture, and commerce of far more than 850,000,000l., thy taxation is in the aggregate trifling, though large when compared with other nations, contrasting the populations. The United Kingdom is the richest community in the known world. The average income of every soul, man, woman, and child, is above 25l. annually! whilst free trade places the luxuries of life within the reach of every industrious and prudent man and family. Again, the social progress of the United Kingdom has made wonderful strides in favour of the masses. Education, cheap postage, and telegraphy expand the mind, give freedom of thought and interchange of sentiments, whilst the latter open out rapid communications between nations, peoples, and kin, and foster competitive trade and commerce through the suppression of monopolies.

The crisis of 1866 has resulted in great benefits to the home industries of the country, and in no respect more so than in railway reforms, and consequent prospective progress and prosperity. Railway finance is far better than formerly—permanent debenture stock, instead of short and periodical renewals, has effected great economy, whilst retrenched expenditure, enhanced practical management, and more efficient executives, all tend to give this class of property a status and value which it never at any former epoch possessed. The revenues of our railways have made swift advances during the past half-year, as compared with the corresponding half of 1870:—Great Eastern, 52,896l.; Lancashire and Yorkshire, 126,045l.; London and North-Western, 220,422l.; London, Brighton, and South Coast, 50,057l.; Midland, 181,961l.; North-Eastern, 205,061l.; South-Eastern, 66,882l.; Caledonian, 61,648l.; Great Western, 100,829l.; and North British, 54,127l. Joint-stock banks, otherwise than those of a "limited" character, it must be remembered, are exposed to unknown casualties to shareholders, not only so long as their names remain upon the "register," but also, in case of their assigns not proving responsible, for even three years after transfer of their shares creditors are wholly protected from loss in such wide-spread "constituencies" as the London and Westminster, London and County, National Provincial of England, and many others of our metropolitan and provincial joint-stock banks, yet liabilities to the proprietors are "unlimited" to the full extent of the conversions of the banks. This unlimited responsibility is severely felt by the trustees under the will of a Mr. Palmer, who held 37 shares in the Birmingham Banking Company, which stopped payment in June, 1866. Vice-Chancellor Malins has decreed the trustees to pay 1900l. calls on these shares, simply because they delayed realising them within 12 months after the demise of Palmer, whilst they held them on from April, 1864, to June, 1866, when the bank stopped payment. There can be little doubt entertained in respect to the coming half-year dividends on joint-stock banks. The commercial dealings of the country have for months past been in an extremely healthy and satisfactory condition; the hemisphere has been cleared of a host of ephemeral concoctions and speculative firms, which formerly dealt almost exclusively upon credit; hence at moments of pressure they had to succumb to force of natural laws and circumstances. The business of banking is perfectly legitimate and profitable, and it is only when such institutions become allied with adventurers instead of bona fide finance that risks are incurred. It is to be deprecated if joint-stock banks, through competitive cravings after gains, infringe upon the business of bill-discounters and money-lenders, and thus subject themselves again to the culminated catastrophe of May, 1866.

The coal and iron products of the United Kingdom are worth to the miner about 20,000,000l. annually, yet the consumers have to pay at least 100,000,000l. for the mineral and metal. The costs of carriage per rail and ships, commercial gains and expenses of depôts, carting, delivery, commissions, &c., absorb the difference betwixt the two sums, so that it will be seen at a glance that merchants and carriers secure far greater gains than the miners, yet many of the most opulent and wealthy families in the land owe their position and influence to the start which coal and iron mining gave them. At Barnsley, Barrow-in-Furness, Middlesbrough, Stoke-upon-Trent, and Wolverhampton the iron trade is good, and great expectations of increased business and advancing prices are looked forward to for the coming year. The reports from the coal districts are highly satisfactory, and the future is allied with cheering prospects. In Wales, both north and south, lead mining has greatly increased, and a great number of new undertakings command attention upon the London and other share marts of the kingdom. There has not, however, during the past year been any very important discovery of mineral wealth made, although in several instances the market value of shares rules high. Rampant markets are not generally desirable arenas for the uninitiated to visit—the time to buy, or rather to invest money, is when demand for shares is slack, and intrinsically valuable properties all but neglected. There are many of this class that can now be selected with judicious discrimination, and from which large gains must accrue during the coming year as pioneer point after point become developed, and which must, as yield increases, attract public attention, and thence become market favourites. It is to Cornwall that we must look for our best and most profitable mines, and those yielding tin stand at the head. It is true that we have a Van in Wales, yet we have a Tincroft giving profits of 1000l. per week in Cornwall; a Dolcoath paying 45,000l. annually, against a Miner in Denbighshire; a Carn Brea against Great Laxey in the Isle of Man; and a Cook's Kitchen to match a Lisburne in Cardiganshire; with Botallack, East Pool, Great Vor, Phoenix, Par Consols, Trumpet Consols, and a Kitty (St. Agnes), to match any other seven mines situate throughout the United Kingdom. There are also in the west peninsula of England rich copper mines, as for instance, West Seton, South Caradon, Devon Great Consols, with others; and lastly, amongst the numerous undertakings well worthy the attention of the investing capitalist may be classed the following—South Crofty, Basset, South Frances, South Carn Brea, West Basset, Margaret, Spear Moor, West Trumpet, North Pool, Pendarves, St. Ives

Consols, New Hingston, New Hendra, Buller, Grenville, Lucy, Mary Ann, North Buller, Penballs, St. Just United, and Trannack.

The price of tin is good, and likely for a time to advance, yet in two or three years the increased yield of tin ores must necessarily exercise an adverse influence on the markets. Copper is at a fair price, and many mines ought to pay good dividends. The present is the most charming epoch in Cornish mining that I have known during 40 years of practical experience, and for the ensuing year all associated with such pursuits should reap a golden harvest; then let us hope that the Cornish motto—One and All, fair play, fifteen balls—prove in practice what it is in spirit—viz., fair play for "one and all," and not as some represent, fourteen to one against the outsider. A happy and prosperous New Year to all.

R. TREDINNICK,

Consulting Mining Engineer.

3, Crown-court, Threadneedle-street, City, Jan. 1, 1872.

#### "WHAT TO SELECT—WHAT TO AVOID"—No. VI.

SIR.—I ventured last week to observe that in the face of "national calamities and continental disruptions adversely affecting every description of monetary security, mining had steadfastly held its own, not only having maintained its negotiable value, but also realised an enhanced value for its produce." While mining invariably manifests this desirable freedom from any undue depression, it largely participates in the inevitable reaction which follows. The state of the revenue, the bankers' clearing-house figures, the returns of exports and imports, are the tests indicating the active and prosperous condition of the trade of the country; and, as is evidenced from day to day, no produce or commodity so materially benefits from such a condition of things as the value of metals. The high prices ruling in other securities arise, we are told, from three causes—cheap money, cheap Consols, and improved credit. "But," asks the same authority, "will this rise be permanent, cheap money being obviously extremely temporary?" Dearer money will, perforce, cause a sharp reaction in the marketable value of securities generally, and when this shall take place—as it most assuredly will—for "the tide which came in will some time go out, when there will be low water as there is now high water"—mining values will remain unaltered, depending almost entirely upon the value of metals, which enhances proportionately with the expansion of trade.

Every feature unmistakably indicates the force of your remarks, that "the measure of improvement in the metal market is assuming such strength and dimensions that nothing but vast speculation or some untoward complication of events which have not as yet given any sign of their approach can stay its onward course." It is not too much to say that mining (as an investment) is just entering upon a new career of unprecedented success, and that its results will establish it more firmly than heretofore as the most remunerative security in which capital can be employed.

For years past mining—I mean sound, legitimate mining—has been gaining favour among the investing public; and, now that it has been, so to speak, born anew it is to be sincerely hoped that its career will not be marred by unwholesome accretions stultifying its otherwise satisfactory development, but that it will gain honest and healthful strength, yielding increasing results with advancing years, until it shall occupy that exalted position which it deservedly merits as the most important branch of our national enterprise. Let each one whose business and interest it is to encourage the extension of this profitable channel for the employment of capital fell with a relentless hand every upas tree that insidiously sheds an atmosphere that arrests legitimate progress.

CREEGBRAWSE.—This mine is situated immediately to the east of Wheal Garland and Wheal Unity, both of which have been exceedingly rich mines. There are only 507 shares, which are held by a few local gentlemen, and until very recently they have seldom been obtainable; and but for the fact of the late Mr. F. Pryor's interest having been sold by his executors, in all probability this mine would have been little heard of. A considerable amount of money has been divided amongst the shareholders at different times; and the present profits are estimated as equal to 12 per share per quarter. This is principally owing to the more vigorous working adopted by the recently appointed manager, and the abolition of various superfluous expenses. One noticeable fact is that for years past no samples of the tinstuff had been taken by the agents, and whatever was raised from the mine was stamped totally regardless of its quality, or without knowing even whether it would pay the cost of returning. The stopes are now set on tribute, and everything is sampled as soon as raised. It is expected that fully 100l. per month will be saved by this arrangement, permanent profits will be realised, and satisfactory dividends will be declared.

WEST TANKERVILLE.—This mine adjoins the Roman Gravels, and contains some of the most productive lodes of that mine. Mining in this district dates back to the Roman period; but in later times the Snailbeach, Oven Pipe (now called Tankerville), Roman Gravels, Bog, and Pennerley were worked conjointly by a local company, known as the "Laurences." This company expended nearly 500,000l. in mining operations throughout the district, the principle part of which was supplied from returns of lead realised from the West Tankerville, in those days known as Old Batholes. The Wood vein, the chief lode worked upon, yielded 300,000l. worth of ore (pig-lead at the time selling at 8l. per ton) from surface to the 18 ft. level.

It may not be generally known that, through mismanagement and misrule generally, the Laurences came to grief, and abandoned all their mines in succession. Since then Snailbeach has yielded enormous fortunes, the present returns of lead being 250 tons per month. Roman Gravels and Tankerville have proved themselves no mean neighbours of Snailbeach. Capt. Arthur Waters, the manager, states that the Roman vein, so productive in Roman Gravels, runs parallel to the West Tankerville boundary, and will be altogether into the sett at 200 fms. below adit, when the mine will contain all the lead-producing lodes of both mines. Besides the 13 lodes known to be within the property, the Snailbeach great lode comes into and traverses the sett for about 1 mile.

These and other facts justify Capt. Waters in expressing the greatest confidence that this mine contains all the elements necessary to great success, and that its future history will record large returns of lead from the various lodes. Some short time since the shareholders decided to sell to another company that portion of the mine which they were never likely to require. By this means West Tankerville has been placed in a sound financial position, and within the next month or two (the machinery being completed) large and increasing monthly returns of lead will be made.

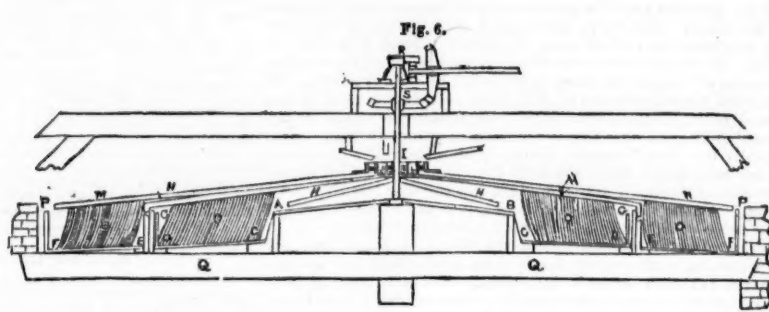
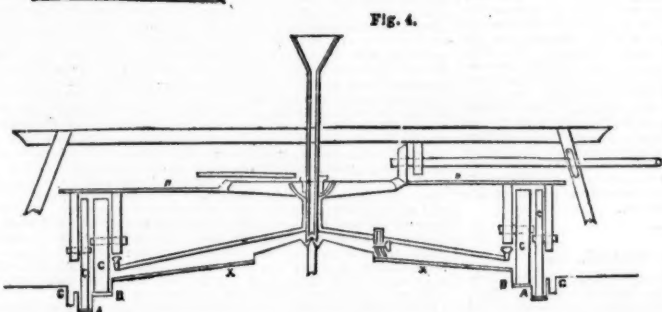
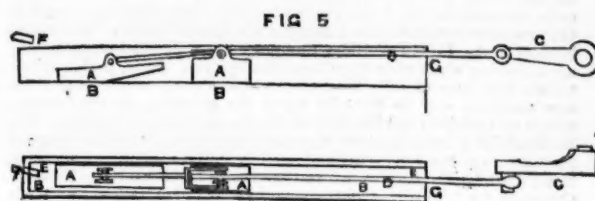
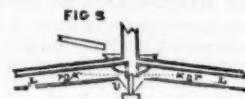
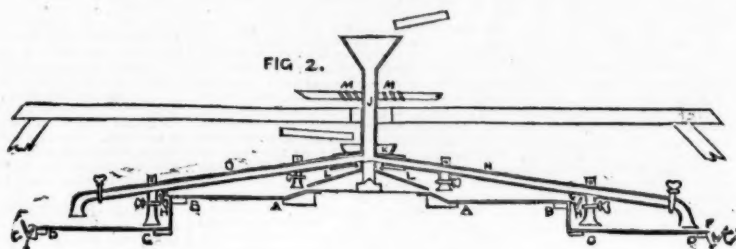
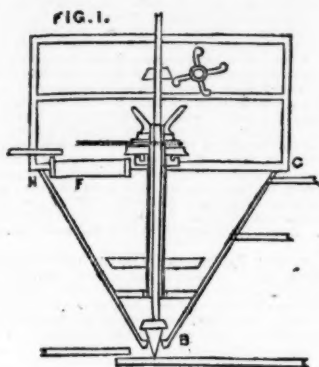
There is no geological or mineralogical reason why upon adequate development this mine should not be in every essential equal with Tankerville or Roman Gravels; indeed this is, I think, plainly indicated by the fact so strongly dwelt upon by Capt. Waters at one of the recent meetings of the company—that all the great deposits of lead in this locality are found where the rocks are much contorted by the apparent influence of the greenstone, and nowhere in Shropshire does this rock come up in greater force than in West Tankerville. There are 12,000 shares of 3l. fully paid, and the price is about 34.—1, Pinner's-court Old Broad-street. F. WM. MANSELL.

#### THE MINERAL RESOURCES OF IRELAND.

SIR.—I am not surprised that Mr. McCormick, the owner of the Curraunestate, in the county Mayo, is so indefatigable in endeavouring to have the property taken up by a public company, believing, as he does, that it contains valuable mineral deposits, though not yet proved. I can fancy the writer of the letter in the Journal of Dec. 30, signed "E.," sitting at Mr. McCormick's elbow when he wrote it; all through it conveys the same expressions Mr. McCormick has for years used when portraying the great value of the estate, and the prospective working of the minerals. How was it that, when many years ago Mr. Henwood and a Mr. Molyneux, a gentleman then well known in the mining world, resided for months upon the estate, and called in the aid of Mr. Spargo to map the estate and lay down the lodes, those three mining celebrities failed to get up a then intended company, the three being promised to largely participate in the sale of the estate to the company? There are many mining men who will remember their activity upon that occasion, and since that period this estate has been hawked about and submitted to many enterprising mining capitalists to my knowledge. The 3000 acres of good



## IMPROVEMENTS IN MACHINERY FOR DRESSING ORES.



## IMPROVEMENTS IN MACHINERY FOR DRESSING ORES.

It has frequently been asserted that in the art of dressing ores the Germans are far in advance of the English miners, and when the extremely low-produce ores from which the former succeed in realising a profit is taken into consideration, it is not surprising that many should have accepted the assertion as an established fact. But Cornish miners have to treat low-produce ores too—especially tin miners, who consider that they have excellent mineral to work upon if it yields from 40 lbs. to 50 lbs. of black tin to the ton of stuff, and of this from 5 to 6 lbs. has been lost in preparing it for sale—so that they have an equal interest in using the best possible dressing machinery within their reach. The improvements recently patented by Capt. J. BOYNS, of Botallack, embrace an entire series of apparatus, but the essential feature in the invention appears to be the careful sizing of the ore before submitting it to the other processes necessary for separating the black tin or other metal from the gangue with which it is associated.

Although each machine is complete in itself, they are specially designed to be used in combination with each other, and so used they are adapted to treat the various ores in all their stages—from the stamping, crushing, or pulverising machinery—to fit them for smelting or market. Capt. Boyns points out that the ore is not only divided into different qualities or sizes at the commencement, but the whole of the ore matter is principally held in suspension in the water until separated from the particles of ore. The ore is, therefore, not so likely to be lost as when the refuse is deposited with the ore in buddles, to be removed by hand labour, and subsequently divided into qualities or sizes by the system of mixing or toasting now in use. There is also a great saving of expense in the first laying out of the dressing-floors, as the machinery being more expeditious and efficacious, less is required; and as it is always at work dressing the ore during the process of stamping, less water is required than is at present used; and as it wants but little motive-power, the water that contains the ore will usually be found sufficient to work the washing machinery, by each having an undershot water-wheel. Capt. Boyns further claims that, as there is no danger of stripping, to which most modes of dressing have hitherto been found to be prone, there will be much less liability to loss from want of proper attention than has formerly been the case.

The new machinery which is now being extensively manufactured by the TUCKINGMILL FOUNDRY COMPANY, Camborne, is not intended to supersede the present mode of breaking, crushing, stamping, or pulverising the ores in the stone as raised from the mine, but merely to deal with the ore after they have been reduced to a proper size, except that a new mode of pulverising "tailings," "roughs," and "burnt leavings" is proposed. Metallic ores are more easily separated from the waste or matrix with which they are combined when newly crushed or pulverised than at any other time. While the newly broken ore is held in suspension in the water, fresh streams of clear water should be immediately brought into action upon it to separate it from the waste, and also to separate the different sized ore before it is allowed to deposit or settle down, and means should afterwards be applied for the proper and efficient treatment of the various classes of ores.

In the preliminary process of separating or sizing, the ores are separated into different sizes as they come from the stamps, crusher, or pulveriser, by means of a funnel-shaped pit or cistern (marked H, B, C, in Fig. 1). The stream of water that contains the ore is conducted by means of a launder into a receptacle, F. The bottom of the receptacle is full of small holes to cause the ore suspended in the water to flow into the cistern as quietly as possible.

In the centre of the cistern is a tubular axle, with any number of blades attached to it. This is caused to rotate fast or slow, just as the nature of the ore requires, so as to keep the ore suspended in water, until a separation is effected of the different sizes. The heaviest particles sink to the bottom, and are let out through a hole partially closed by a moveable conical plug. By lifting this plug little or much at a time, or working it fast or slow, the supply to the washing machinery is governed. The next sized ore is let out through an opening a little above the middle of the cistern on the opposite side from which it entered, and the finest size or lightest ore flows over the top; each size is then carried by the water over separate washing machinery adapted for saving it. To effect a good separation, or sizing, of the ore a stream of clear water is let down through the tube in the centre to free the rough ore from slime, &c. The depth and size of the cistern depends on the quantity and quality of the ore to be treated, and on the incline of the dressing-floors. Modifications of this may be made to suit special conditions of dressing-floors.

The washing machinery receives the ore that comes from the separator, or when thought advisable from the stamping, crushing, or pulverising machinery, or at any stage of the present method of dressing. The ore is washed by a machine with, by preference, two circular inclines (erroneously represented as horizontal—A, B, and C, D—in Fig. 2), but one incline only might be employed. The inclines are convex or concave (the former preferable), the inner one about 14 ft. diameter, the outer one of 24 ft., or in that proportion. The inclination will depend, to a great extent, upon the size and quality of the matter being treated, but 1 in. to 4 ft., or thereabouts, is suitable for very fine ore of low quality; rough ores of better quality will require very much more. The inclination of the outer inclined plane (C, D) should be a little more than the inner one (A, B), as very nearly the same quantity of ore matter suspended in water will have to flow over a larger surface. There must be a sudden drop over the sharp outer edge (E and F) of each circle to permit of the ore deposit being washed off by the application of clear water, and to prevent its running or "trickling" down as it will continue to do into the inner conduit at all times, except when being subjected to the stream of water. The drop at the outer edge of each circle is arranged to permit of the discharge of the water.

The smaller inner incline (A, B) is surrounded by a "launder" (H)

fixed under its outer edge to carry off the ore, but leaving a sufficient space between the edge of the inner circle and the conduit or launder to permit of the tin stuff in the water running or trickling down at all times, except when the stream of water is brought to bear on it. The larger outer incline or circle (C, D) is surrounded by two narrow launders (G and I), the outer one (G) to carry off the ore, and the inner one (I) the refuse. Standing up in the centre is a hollow iron pipe (J), which serves as an axis. Fixed to this is an iron pan (K), which receives the ore suspended in water and lets it out again around the central axis over an inclined plate of iron (L) of a size in proportion to the other parts of the machine, say about 4 ft. This inclined iron plate may be stationary, with a well in its centre, as shown at Fig. 3, or made to revolve slowly with the axis and pan (J and K), as shown at Fig. 2, by means of a worm-screw or other available machinery. The rotating plate is divided by narrow ribs to separate the stream, that the water may flow regularly over the whole surface of the machine at the same time. The refuse is carried off continuously by the water into the narrow gutter (I) around the outer edge (F). Where the quality of the stuff contained in the water is sufficiently good it can be conducted to another machine to be re-washed, or if containing no ore, or ore of a low quality, it may be allowed to escape altogether. The ore is deposited in two qualities, No. 1 on the inner incline (A, B), and No. 2 on the outer (C, D).

The ore deposited on the two inclines is then washed off into separate launders (H and G) by means of streams of clear water conducted from the iron pipe in the centre (J) by four smaller pipes (N and O) fixed to it near the bottom, which moving slowly around with the plate (L) and axis (J) gradually and uniformly operate on the whole of the surface, and wash the deposit into the conduits (G and H). The surface of the inner and outer inclines or circles (A, B, and C, D) is composed of wood (planed or unplanned according to the description of the stuff under treatment) divided into small sections, strips, or frames about 6 or 8 in. wide, tapering towards the centre. These sections, strips, or frames at the outer end of the large incline or circle are narrowed by the introduction of small wood slips or wedges, in order that the stream may be sufficiently concentrated to obtain force enough to wash off the deposited ore. The strips are divided from each by thin pieces of iron, copper, or other suitable material. The divisions in large machines may be made of wood in the shape of wedges, so that the strips may be of equal breadth, or nearly so, from the top to the bottom. This will be found desirable for some ores, but in most cases it will be best to let the water spread as it runs down. By means of this division the stream of clear water is brought to bear upon only a section of the inclined plane at one time. Arrangements must be made by tap, flushet, small pipes, or other available appliances for conducting the stream of clear water over the machine, and for regulating the quantity; and also for carrying off any surplus supply. One pipe washes off the ore, the other carries off the refuse, the outlets being placed at different distances from the axis. The height at which the water can be brought into the central axis will determine the amount necessary. Arrangements must always be made to secure a sufficient supply, and so managed as to carry off the ore deposited on the strips, with such an amount of force that when brought to bear upon one section at a time it will wash over the first narrow gutter (I) of the outer circle (C, D) into the outer ones (G and H) for further washing if required. The ore from the inner circle may be conducted into the launder by a spout attached to the pipe that carries the water to wash off the ore. By the adoption of this plan of washing ores a series of small dead frames are made available, a constant supply of water containing the ore is allowed to flow over them, while by means of the pipe conveying the stream of clear water the refuse and ores are properly separated, and removed to their respective receptacles without the intervention of any manual labour, while a great deal of time is saved, so that less machinery and water will be required. Several other modifications of this washing machinery are proposed for the treatment of "slimes," "roughs," and other special kinds of material, some being concave, others convex.

The method proposed for crushing or pulverising the roughs is shown in Fig. 4. In principle it scarcely differs from the Chilian mill, used for grinding and amalgamating silver ores in South America. One or more circular troughs or trenches (A, B) are constructed (say) from 9 to 18 ft. diameter. The bottom of each trench is made of iron, steel, or some other very hard material, and may be either square or circular, preferably the latter. In these strong and heavy wheels are placed, and connected with proper driving gear by means of strong arms (D) of wood or iron. The weight of all the machinery and driving gear is made to rest on the wheels to still further increase their efficiency. The rough ore suspended in water is supplied into an iron pan in the centre, and by it delivered to the centre of an inclined bed (X), over which it flows to the inner side of the trench. As the ore is crushed to its proper size it is allowed to flow from the trough on the outer side, which is made a little lower than the inside, and is provided with a conduit or launder (G) to convey the water and finely-crushed ore to where it may be required for further washing.

When the rough ores require to be reduced to a very fine powder the machinery shown in Fig. 5 is used. A, B are slabs of iron, steel, granite, or other hard material made to work backward and forward in a trough (E) by means of a crank (C) and a sweep-rod (D). The slab of iron rises and falls a little with the motion of the crank, and to secure this motion the slab must take its motion direct from the crank, as shown. When it rises the water carries the roughs under it, and as it falls, moving forth and back, and from side to side, by separate motions, it grinds the rough ore to a very fine powder. The roughs are carried into a trough at one end (F) by the water, and when reduced to a proper size are allowed to run out at the opposite end (G) for further dressing. Very hard rough ores may be previously heated in a furnace by means of an iron tube arranged somewhat like that of Oxland and Hocking's calciner.

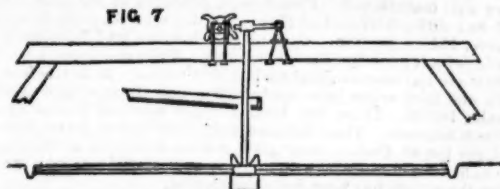
The operation of "packing" has hitherto been effected by

means of large round tubs or kieves, made with staves and hooped like a barrel. When the "tin stuff" has been washed and re-washed by means of the buddles, it is placed in these "kieves" with water; the whole is then stirred up and kept in motion for some time, and while it is settling the "kieve" is continually knocked or rapped with a hammer or bar, worked either by hand or machinery. The vibrations caused by the knocking separate the tin ore from any earthy matter that may still be present, the tin falling readily to the bottom, but the refuse being lighter rises to the top, and while the shaking is continued remains in suspension, and is subsequently "skimmed" off, leaving the residue of fine tin ore ready for smelting. In order to effect this "packing" in a more efficient and expeditious manner, the "packing buddle" shown at Fig. 6 is devised. It should be about 24 feet in diameter, with a raised centre (A, B) about one-third the size of the whole buddle. The surface (E, F, G, D) which is made of wood, may be either quite level, or slightly inclined, except in cases where the ore and the refuse are very easily separated. The surface of the centre or head (A, B) must be inclined from the centre outwards to permit of the regular flow of the ore matter. The outer circle of the buddle may be equally divided into two parts, which permits of two classes or qualities of ore being buddled or packed at the same time, and where the buddle can be made sufficiently large allows a large quantity to be under treatment at the same time without injuriously affecting the operation. The division may be made by means of a fixed upright (G) of wood, slightly inclined on the outer side, and where the washing machinery described under head No. 2 is in use the ore from the inner and outer machine may be packed in this buddle at the same time.

Where there is only one quality of ore one incline is sufficient, in which case a larger raised centre may be advantageously used.

The ore is distributed by means of spouts or shoots (H) from a large iron pan (I) fixed to the centre axis. When the outer circle of the buddle is divided into two parts, the ore in suspension in water will be supplied from a pan attached to the axis, which is divided into three parts, the inner one (K) receives and distributes the best quality ore for the inner (C, D) part of the buddle, the middle one (L) receives it from the outer part (E, F), and the outer pan (M) receives clear water for washing off the waste matter. If there is no such division of the buddle, then the pan will only be divided into two parts, the one for the ore matter, the other for clear water.

Attached to the axis are radial arms (N) carrying aprons or brushes (O) of material sufficiently stiff to keep a true and smooth surface to the heavy deposit of ore at the bottom. Around the outside of the buddle will be placed a narrow trench or drain (P) to take away the water holding the lighter portions of the ore matter which are still held in suspension, and which in most cases will be of such a quality as to be worth a fresh dressing. The waste from the inner circle, where there are two, will flow over the division (G) into the outer one, and thence with the other refuse into the outside trench. The whole of this packing buddle is fixed to and on strong beams (Q) of wood; these beams should cross each other directly under the centre, or be so connected that they shall move or vibrate with the centre of the buddle. The beams rest on their extremities only, and the middle is consequently suspended, a vibrating motion is then given to the buddle resting upon them by causing a hammer (R) to continue striking on the top of an axis shaft or rod (S) fixed on or connected firmly with the centre of the beams or their connections. The hammer is made to give its blows by means of "cams," or other suitable machinery, or it may be so attached to the machinery as to give its blows direct. The blows may also be given below the beams, or in any other manner that may be found desirable. By means of this packing buddle the ore is deposited and settled, and the refuse comes to the surface and is carried off and disposed of altogether, or saved for re-dressing as the case may require. The subjoined illustration shows another modification of packing buddle.



The improvement of our existing appliances in mining, and the saving of the mineral now so extensively going to waste, is certainly the most important task before the scientific miner, in order to enable us to maintain our present flourishing position, or, on the other hand, to tide over another period of depression, should such again unfortunately occur. A careful examination of the descriptive details and diagrams of the several machines embraced in the invention can leave no doubt that Capt. Boyns has given every portion of the process the fullest consideration, and studied to devise apparatus exactly calculated to accomplish the desired object; whilst his appointment of the Tuckingmill Foundry Company as his sole manufacturers will prevent the smallest risk of failure through inattention to quality of material and workmanship. The experimental set now being erected at Dolcoath Mines will very shortly (probably early in February) be ready for practical working, when, as it is intended to invite public inspection, all interested in the economic treatment of ores will have an opportunity of determining the merits of the apparatus for themselves.

**IMPROVEMENTS IN STEAM GENERATORS.**—The novelty in the invention of Mr. S. MOORHOUSE, of Heaton Norris, consists firstly in placing within the flue of steam boilers, so as to form the bridge, a cylindrical chamber around which and the flue there is an annular space, the junction for circulation of water between the boiler and the said chamber being made by means of pipes above and below the said chamber, in the lower one of which an expansion disc joint is provided in order to compensate for the contraction and expansion of

**SHAPING METALS—SOMETHING NEW.**—In a process lately proposed for shaping metals a mould is made in sections to suit the article required, and a sheet of metal is placed in it, after which a cover is clamped on to the mould, and water pressure is conveyed to the interior by a pipe, whereby the metal is expanded to the counterpart of the mould.

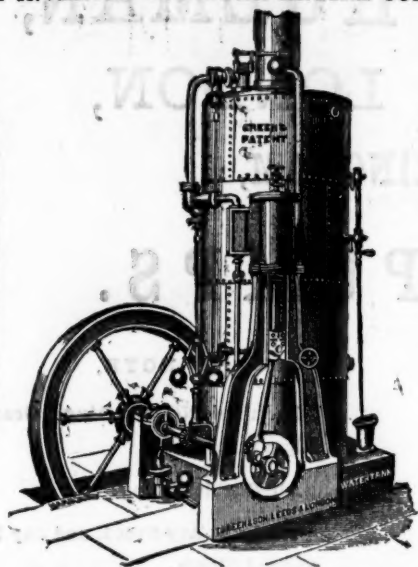
**Mining on the Pacific Coast.** The accounts that are being received of the various mines in the different sections are all that could be wished for, developments which have already been made in the Golden Chariot that will, no doubt, result in its becoming again a dividend paying mine. The mines in the Elly district are contributing their regular amount of bullion, while those upon the Comstock are daily making developments confirming the existence of bodies of ore in the other mines than those already discovered. The prospects for the coming year to be a successful one are most flattering, and it promises to be the most successful of any in the mining era.  
The south drift at the Elly mine is about 90 ft. below the surface, and is down 95 ft. below the 850. Within 290 ft. of the 900 level is in 46 ft., the face showing low grade ore, but improving as they go east. The sill floor on 1100 level is 135 ft. in length; the face is 50 ft. in width, and in very fair ore, assaying \$70 to \$100. The south drift is in 250 ft., and still in good ore. The cross-cut from this point is in 10 ft.; the mass of it hard porphyry. The pay streak at this point is 15 ft. in width, and will assay \$80 on an average. The east cross-cutting through thus far 13 ft. of gold, will assay in 35 ft.; the face is 50 ft. wide, and is down 34 ft. in good ore, which assays \$100. A new vein mine is down 34 ft., and in good ore. The rise is 44 feet; it was made a cross-cut to the west from top of rise 25 ft.; the face of it in good ore. During November 5444 tons of ore were shipped to the mills.—**GOLDEN CHARIOT:** Two rich strikes have been made—one in the 5th level, nearly 2 ft. wide, with a pay streak from 18 to 30 in. in width, of as fine looking ore as was ever seen in the Chariot during its palmy days. Another strike, also in the 5th level, nearly 2 ft. wide, similar in character to the first, has been made in the 5th, fairly glistening bright gold and silver ore. Under the circumstances it is reasonable to suppose that the entire body of rich ore exists between the 4th and 5th levels, south of the shaft. Had one of the first pieces that was broken out of the vein assayed. The

ogton is working right along, and will continue to do so, as also the South Star. OPHIR.—The Irene is on the south side of the canyon, about 500 yards from the Brevoort mill. The vein is 6 ft. wide, and had only 15 ft. in, and produces fine milling ore; it has a slate wall on one side and limestone on the other, and a fissure vein. Close to this mine lies the alkali, a new discovery, and the Irenes of the region, if they are sinking a shaft, and it already shows a vein of 14 ft. Two assays on the Irene ore have been made—one \$500 and the other \$800. The Black Hawk Mine, a few feet below the Irene, shows a vein of 5½ ft. of regular black spar and fine milling ore; no base metal whatever. They have unmined in the mine about 16 ft.; the average of eight assays yields \$60 to the ton. This mine is very close to the mill, the distance being only about 125 yards. The Irenes of the region, the ledge about 40 ft. in depth, the ledge being 5 ft. wide, it is free milling ore, and assays from \$30 to \$400. There are 1000 feet at the mine.

**GENERAL BRAZILIAN.**—Nov. 18: At St. Anna the shallow adit No. 1 is still wet and difficult to handle; no alteration for the better has yet taken place. The shallow adit, No. 2, is under suspension. At the old adit the level driving north from small shaft has been extended 4 feet, the force were then removed to drive a level south from same shaft; 18 feet has been driven, but nothing yet has been discovered. We have hands now employed clearing

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PROGRESSES through Aberdeen granite at the incredible rate of 10" per minute.

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This Wheel is at work in a great many places, to which  
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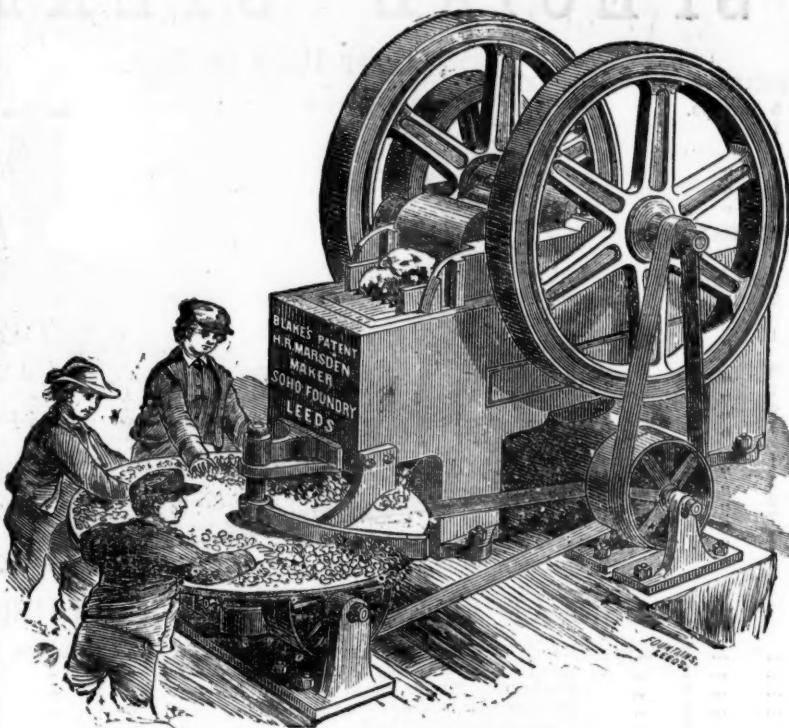
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This is the only machine that has proved a success. This machine was shown in full operation at the Royal Agricultural Society's Show at Manchester,  
and at the Highland Agricultural Society's Show at Edinburgh, where it broke 1½ ton of the hardest trap or winstone in eight minutes, and was  
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It is rapidly making its way to all parts of the globe, being now in profitable use in California, Washoe, Lake Superior, Australia, Cuba, Chili Bra-  
zil, and throughout the United States and England. Read extracts of testimonials:—



**The Parys Mines Company, Parys Mines, near Bangor, June 6.**—We have had one of your stone breakers in use during the last 12 months, and it has given every satisfaction. Some time after starting the machine a piece of the moveable jaws about 20 lbs. weight, chilled cast-iron, broke off, and was crushed in the jaws of the machine to the size fixed for crushing the emery.

**For the Parys Mining Company.**  
H. R. Marsden, Esq. JAMES WILLIAMS.

**Eaton Emery Works, Manchester.**—We have used Blake's patent stone breaker made by you, for the last 12 months, crushing emery, &c., and it has given every satisfaction. Some time after starting the machine a piece of the moveable jaws about 20 lbs. weight, chilled cast-iron, broke off, and was crushed in the jaws of the machine to the size fixed for crushing the emery.

**For the Parys Mining Company.**  
H. R. Marsden, Esq. JAMES WILLIAMS.

**Alkali Works, near Wednesbury.**—I at first thought the outlay too much for so simple an article, but now think it money well spent.

**Welsh Gold Mining Company, Dolgelly.**—The stone breaker does its work admirably, crushing the hardest stones and quartz. WM. DANIEL.

**Our 15 by 7 in. machine has broken 4 tons of hard whinstone in 30 minutes, for fine road metal, free from dust.**

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**Kirkless Hall, near Wigan.**—Each of my machines breaks from 100 to 120 tons of limestone or ore per day (10 hours), at a saving of 4d. per ton.

**General Frémont's Mines, California.**—The 15 by 7 in. machine effects a saving of the labour of about 30 men, or \$75 per day. The high estimation in which we hold your invention is shown by the fact that Mr. Park has just ordered a third machine for this estate.

**For the Parys Mining Company.**  
H. R. Marsden, Esq. WESTON, near Buncorn.

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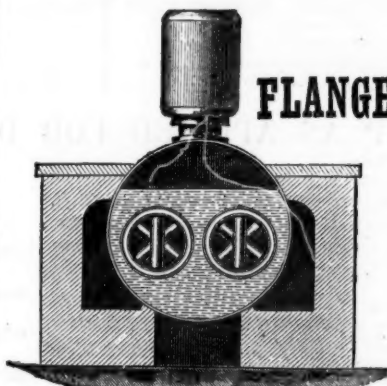
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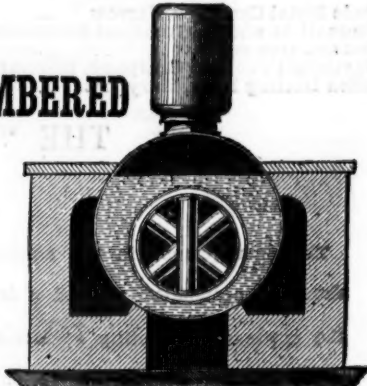
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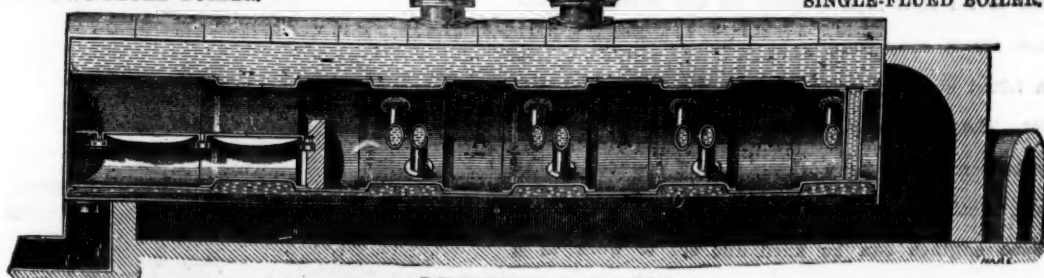
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USEFUL INFORMATION concerning the various learned societies, mining associations, engineering institutes, and kindred public bodies.  
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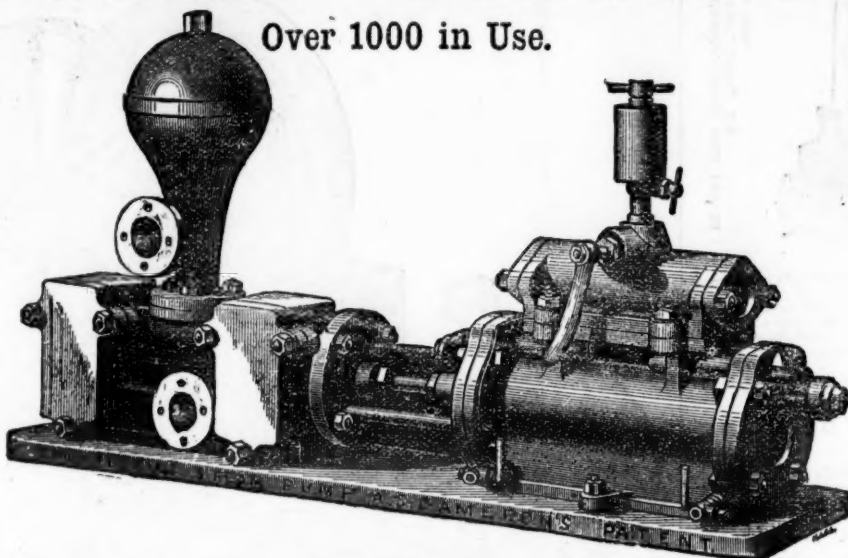
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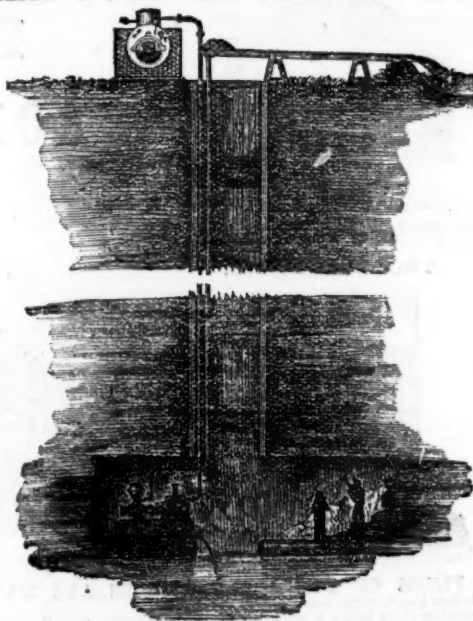
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The arrangement in the accompanying illustration shows an economical method of draining mines without the expense of erecting surface-engines, fixing pump-rods, or other gearing. A boiler adjacent to the pit's mouth is all that is necessary on the surface; from thence steam may readily be taken down, by means of a felted steam-pipe, to connect the pump with the boiler. The pump may be placed in any situation that may be convenient for working it, and connecting the steam, suction, and delivery pipes.

These engines can be fixed and set to work in a



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To estimate the quantity of water to be raised by any given size of pump refer to the tabulated list below. It is recommended to use long-stroke pumps where the height exceeds 100 ft., so that the largest result may be obtained with a minimum wear and tear of the pump pistons and valves. The pumps are provided with doors for ready access to all working parts.

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Diameter of Steam Cylinder .....	2½	3	4	4	6	6	6	7	7	7	8	8	8	8	10	10	12	12	14	16	26
Diameter of Water Cylinder .....	1½	1½	2	4	3	4	6	5	6	7	4	6	7	8	6	7	8	10	8	7	6½
Length of Stroke .....	6	9	9	12	12	12	12	12	12	12	12	12	12	18	12	12	18	24	48	24	72
Strokes per minute .....	100	100	70	50	50	50	50	50	50	50	50	50	50	35	50	50	35	—	—	—	—
Gallons per hour .....	310	680	815	2250	1830	3250	7330	5070	7330	9750	3250	7330	9750	13,000	7330	9750	13,000	—	—	—	—
PRICE .....	£10	£15	£20	£35	£30	£40	£47 10	£50	£52 10	£57 10	£50	£55	£65	£85	£70	£80	£100	—	—	—	—

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